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Current Close Air Support Doctrine:

Out of Step With New Technology and Urban Combat Requirements

by

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The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Recent trends in population growth and urbanization will have a direct impact on U.S. military doctrine as U.S. forces experiment and train for urban military combat operations. U.S. rapid deployment forces continue to focus on light infantry units heavily supported by flexible expeditionary air forces, yet current Close Air Support (CAS) doctrine has not realistically addressed the lethality or limitations that the urban battlespace presents to either the terminal controller or the delivering platform. A doctrinal sanctuary exists in current CAS doctrine, particularly within the urban battlespace, where the target is beyond the visual sight of the terminal controller yet within the close proximity/detailed integration distance that requires it to be attacked via CAS. Recent experimentation with new connectivity technology creates a form of CAS control that merges the direct and indirect concepts of positive control CAS doctrine. CAS doctrine modification is required.

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Abstract of

Current Close Air Support Doctrine:

Out of Step With New Technology and Urban Combat Requirements

One of the most significant, observable global trends with operational implications is the expanding urbanization and shifting demographics of the developing world. These trends in population growth and urbanization will have a direct impact on U.S. military doctrine as U.S. forces experiment and train for urban military combat operations. U.S. rapid deployment forces continue to focus on light infantry units heavily supported by flexible expeditionary air forces; yet, current Close Air Support (CAS) doctrine has not realistically addressed the lethality or limitations that the urban battlespace presents to either the terminal controller or the delivering platform.

A doctrinal sanctuary exists in current CAS doctrine, particularly within the urban battlespace, where the target is beyond the visual sight of the terminal controller yet within the close proximity/detailed integration distance that requires it to be attacked via CAS. Recent experimentation with new connectivity technology offers a form of positive control while minimizing exposure risk and ineffective observation criteria placed on the CAS terminal controller using current CAS doctrine. This technology creates a form of CAS control that merges the direct and indirect concepts of positive control CAS doctrine. Modernization of current CAS doctrine concepts could take advantage of this new technology and advance tactics, techniques and procedures while returning the tool of effective and precise air delivered fires to the Joint Task Force Commander.

"To learn about CAS (Close Air Support) the best source is still John Wayne in "The Flying Leathernecks" because it just hasn't changed that much."

-Maj. Paul Campbell

USMC (Ret), 1995

INTRODUCTION

One of the most significant, observable global trends with operational implications for the Unified Commander on Chief (CINC) and Joint Task Force Commander (JTF) is the expanding urbanization and shifting of demographics of the developing world. The developing world is also rapidly becoming the largest urban population in history: " The developing world's total urban population will be almost twice the industrialized world's in the year 2000, a figure expected to be four times greater by 2025."[1] These trends in population growth and urbanization will have a direct impact on U.S. military doctrine and training in urban military operations. Recent service sponsored urban initiatives have used the experiences from Beirut to Chechnya in an effort to gain insight and learn the hard lessons of how to effectively employ military forces in the urban battlefield. One item remains glaringly clear: regardless of where the next urban conflict erupts, air delivered fires will be requested.

Historical studies and analysis reveal that only five percent of targets in urban fighting are more than 100 meters from friendly forces and approximately ninety percent are fifty meters or less from friendlies, although a majority of these types of targets are light infantry or crew served weapons. Recently, urban conflicts have displayed an inclination for

adversaries to employ combined arms, such as tanks and artillery and anti-aircraft artillery, within the urban clutter that enhance light infantry or guerrilla type insurgents. Rapid deployment U.S. forces continue to focus on light infantry units heavily supported by flexible expeditionary air capability. Current urbanization trends and recent urban battlefield experiences indicate that U.S. rapid deployment forces will face near term urban contingencies against determined defenders who will bring combined arms threats to bear. U.S. air forces will be called upon to offset armor deficient rapid deployment light forces. The flexibility offered by three-dimensional approach paths, multiple attack angles, and accuracy of precision-guided munitions highlight the value of aviation delivered fires in this environment. These air delivered fires are, by any service definition, Close Air Support (CAS), yet current CAS doctrine has not realistically addressed the lethality or limitations that the urban battlespace presents to either the terminal controller or the delivering platforms.

This paper examines available connectivity technology to minimize the limitations of the terminal controller in the urban environment in conjunction with air platform upgrades and developed or nearly complete air delivered precision munitions, and compares these technological improvement implications to current urban CAS doctrine from the operational perspective of a CINC or JTF Commander. In order to allow a more complete analysis, the focus herein has been narrowed to doctrinal implications during the terminal control phase. Awareness of the capabilities and limitations of the terminal controller, as well as the delivering platform in the urban environment, will help the CINC or JTF Commander to shape the best force and Rules of Engagement (ROE) for a contingency. Precise air delivered fires, conducted under doctrinally modern positive control by terminal controllers able to discriminate between authentic targets and simulations will offset adversary control of both the battle rhythm as well as public support. Perhaps more importantly, the

recommended doctrinal modifications will also help the CINC and JTF Commander regain the confidence to employ air delivered indirect fires in an urban setting in a precise, effective and efficient manner.

CAS DOCTRINE – A FORCING FUNCTION

The link between CAS doctrine and combat effectiveness is pervasive throughout the services' entire force structure and application. There is a bi-directional relationship between doctrine and force execution. Success in joint combat execution is heavily dependent upon flexible application of air support, and the proper organization, training and equipping of air forces performing that mission is directly influenced by doctrinal prescription of CAS roles and missions. Simply put, the quality of air delivered combat applications depends, to a large degree, on the quality and relevance of CAS doctrine.

From a futurist perspective, visionary doctrine may well influence system acquisition, joint organization, tactics and procedures. "What the service chiefs say about the conduct of CAS today should directly influence the weapons systems and force structure available to conduct this mission in future years."[i] Some examples of past service chief force planning and requirement analysis in employment today include specific air weapons platforms such as the A-10 or AV-8B, precision guided munitions such as the laser guided or GPS guided munitions and standardized CAS employment procedures. Both aircraft were designed to be responsive to the ground commanders needs such as timeliness from request to delivered fires and to execute defined minimum accuracy requirements. Precision munitions were designed for more efficiency in striking targets resulting in less risk both in terms of collateral damage and risk to the delivering platforms. Standard employment procedures resulted in better joint application of air assets.

From a current perspective, doctrine directly influences combat execution through senior commander general guidance that formulates specific directives on missions,

organizations, tactics, techniques and procedures for combat force employment. Some examples include control procedures separating CAS as a ground commander requested and ground directed fire, as opposed to air delivered fires beyond the Fire Support Coordination Line (FSCL). CAS, more than other types of air delivered fires, requires detailed coordination with the ground force commander and integration with other fire support measures to support the maneuver force objective.

It would follow that effective doctrine leads to effective execution; however, if current doctrine is unresponsive to adversary interaction in the battlespace, then doctrinal deficiencies hamper effective combat execution.

Historically, doctrine has resulted from either predicted or observed adversary interactions and much of the tactics, techniques and procedures in use by the services today are a direct result of requirements agreed to by the service chiefs. Procedures for conducting air delivered fires in close proximity to friendly units have been developed over the last 40 years to such a point that standard joint application of CAS from any service aircraft is possible. Acknowledging the fact that great strides have been taken by U. S. forces in developing and standardizing CAS application on the open battlefield, very little has been written or doctrinally addressed concerning the application of air delivered fires within the urban battlespace. The logic that open battlefield CAS doctrine will be applicable in the urban battlespace defies the defensive interaction that has been demonstrated by adversaries in historical urban conflicts. Is this logic acceptable, and will CAS be effective using current doctrine? Does current CAS doctrine address munitions and air platform characteristics to counter known adversary interaction? Are planned connectivity systems requirements for terminal controllers adequately addressed in current doctrine? To answer these questions, doctrine needs to be examined in its current form, as applied to the urban battlespace.

CURRENT DOCTRINE

Close Air Support is defined in the Joint Publication 3-09.3 as " air action by fixed and rotary wing aircraft against hostile targets which are in close proximity to friendly forces and which require detailed integration of each air mission with the fires and movement of those forces."[ii] Two key points define the difference between CAS and all other air delivered fires: First, close proximity to friendly forces and Second, detailed integration. "The word "close" does not imply a specific distance; rather, it is situational."[iii] The requirement for detailed integration is the determining factor between CAS and all other types of air delivered fires. It can be based on proximity, fires or movement. An implied doctrinal constraint of CAS is extreme accuracy and this constraint shapes the relationship between proximity and integration of the fires with movement of ground forces. The Joint Pub goes further to state that, " The terminal controller has the authority to clear aircraft to release weapons after specific or general release approval from the maneuver force commander… The two levels of weapons release authority are positive control and reasonable assurance."[iv]

Positive control is further broken into two methods, direct and indirect control. "Direct control will be used whenever possible. It occurs when the terminal controller is able to observe and control the attack."[v] The section under direct control reads as follows:

> "The terminal controller transmits "cleared hot" when he sees the aircraft is attacking the correct target. There may be times when the terminal controller may not be able to see the attacking aircraft (due to high altitude, standoff weapons, night, or poor visibility). In these cases, clearance to drop will only be given if the terminal controller can use other means to confirm that the aircraft is attacking the correct target and has friendly positions in sight. These may include, but are not limited to, confirming with a verbal description that the aircraft has the friendly positions in sight, the mark in sight, and the target in sight as appropriate."[vi]

The alternate form of positive control is indirect control. "Indirect control is not the preferred method of positive control. It is used when the terminal controller cannot observe the attack, but is in contact with someone who can."[vii]

It is important to note that doctrine requires that the terminal controller must ensure that the aircraft is attacking the correct target and assumes that communication, typically radio contact, between the aircraft and controller is maintained. While the Joint doctrine provides leeway for the terminal controller in order to permit weapons release when the aircraft is not in sight, the terminal controller must discern through "other means" the pilot's intent, and the terminal controller is discouraged from using another observer to observe the attack. This may be an option for open terrain capable of using target marking or land mark descriptions in relation to the target but what happens in the urban environment?

The terminal controller is somewhere in the urban canyons or within an urban dwelling accompanying ground forces, and may not have the option to visually acquire both the aircraft and the target, may not be able to mark the target and may not be capable of maintaining direct line of sight communication. Aircraft munitions may further exacerbate the terminal positive control problem if they are deliverable from several miles away from the target. The terminal controller may elect to sacrifice target acquisition for direct line of sight communication and still not be able to visually acquire the delivering aircraft. It becomes questionable whether the current doctrinal concept of positive control, without amplification, will enable the terminal controller to direct effective air delivered fires. It is also realistic to assume that the ground force commander will require some form of the positive control concept when his forces are in close contact with the targeted adversary.

The only other doctrinal method of weapons release authority is reasonable assurance. Reasonable assurance was born out of necessity during the Vietnam War. Reasonable

assurance permitted attacks to continue in cases where the terminal controller was unable to provide the required " cleared hot" call due to jamming, potential enemy direction finding capabilities or incapacitation of the controller after the initial targeting information has been given and understood. Reasonable assurance is defined in the Joint Publication as a concept rather than a strict definition. "During combat operations, battlefield conditions such as communications jamming or low altitude flight can prevent receipt of positive clearance to complete the attack… Reasonable assurance is not a routine procedure but a set of specific guidelines… This (reasonable assurance) only applies if the CAS aircrew has already received initial targeting information."[viii] While there has been much debate on expanding the autonomy of CAS aircraft under the guise of reasonable assurance, the intent of this form of control is strictly that of permitting an already briefed CAS platform to continue an attack without the final "cleared hot" call under a set of specific guidelines set forth by the Joint Force Commander. Reasonable assurance is <u>not</u> a concept that allows aircraft to engage targets of opportunity as long as the terminal controller agrees that they are indeed enemy targets.

A review of service doctrine reveals that the Joint Publication doctrine has been instituted almost verbatim across the services.

The Marine Corps Warfighting Publication discussion of positive control is identical to Joint doctrine, stating " The terminal controller or an observer in contact with the terminal controller must be in a position to see the attacking aircraft and the target and must receive verbal confirmation that the objective/mark is in sight from the attacking aircrew before issuing the clearance to drop/fire."[ix] The remaining forms of positive control, as well as reasonable assurance, are verbatim from the Joint Publication on CAS.

The Air Force Doctrine Document (AFDD) discussion of positive control says,

" Direct positive control provides a higher level of targeting guidance for the aircrew and provides the greatest level of fratricide protection. Thus, positive direct control is the only method appropriate for controlling CAS in most troops-in-contact situations…Direct control normally requires the terminal attack controller to observe the attacking aircraft, the desired target or targets, and ensure the aircraft is attacking the correct target and is not a threat to friendly ground forces."[x] Interestingly, this same doctrine recognizes a gap in current joint doctrine regarding the use of CAS in beyond visual range (BVR) situations. " Both the published definition of direct and indirect positive control require someone other than the attacking aircrew to physically see the target, while the "reasonable assurance" level of CAS control is specifically stated not to be used as a primary form of CAS control. This creates a doctrinal sanctuary for those enemy forces that fall within the close proximity/detailed integration distance that requires them to be attacked via CAS but outside the range where an observer or controller can physically see them and no FAC (A) is available."[xi] While the remainder of this discussion pertains to a battlefield scenario wherein targets exist beyond the visual sight of the terminal controller, yet within the fire support coordination line (FSCL), the basis of the thesis directly pertains to terminal control within the urban battlespace. In the urban battlespace, targets will exist beyond the visual sight of the terminal controller, yet still in close proximity to friendly forces. The AFDD was the only doctrinal publication that attempted to address emerging capabilities to permit data links between the delivering aircraft and the terminal controller as a variation of indirect control but stated, "This form of control would not likely be appropriate in a troops-in-contact situation, as the risk of fratricide is higher than when the TAC (terminal air controller) has visual (sight) of both the CAS aircraft and the target."[xii] It is unfortunate that this statement appears in doctrine immediately following emerging capabilities that might offer a positive solution to the terminal control of CAS beyond visual range problem. Doctrinal statements such as this may

tend to cripple innovative solutions that continue to emerge as U.S. forces face new adversary interaction. As with the MCWP, the AFDD defines positive control and reasonable assurance in words identical to the Joint Publication.

Naval doctrine generally addresses the forms of positive control from the perspective of the delivering CAS platform, since except for special operating naval forces and selected F-14 aircrews, the Navy does not train or employ terminal controllers for CAS missions. Army doctrine discuses the role of the Fire Support Officer (FSO) as a back-up source of terminal control since the Army relies on the Air Force to train and provide terminal controllers for CAS missions. Regardless of the depth of discussion in these two services' doctrine, the terms and definitions are reproduced verbatim from the Joint Publication concerning the concept of positive control and reasonable assurance of air delivered fires in conjunction with CAS.

In summary, CAS doctrine within the United States services is remarkably identical, with only trivial differences, yet none discuss the inherent difficulties of executing CAS within an urban environment. Analysis of CAS doctrine leads to the conclusion that current doctrine is assumed to be effective in all environments, yet with only minimal imagination, scenarios can be conceived that render the terminal controller incapable of executing a CAS mission in the urban battlespace. Additionally, by not realistically addressing urban terminal control limitations, current doctrine can be accused of limiting research and experimentation designed to offset these limitations and field improved communication systems, munitions and platforms that can effectively conduct urban CAS. Are these limitations a realistic assessment of the next conflict? Is current CAS doctrine so unwieldy that the resourceful terminal controller cannot adapt it to his circumstance? Historical examples of urban conflicts and recent urban targeting experiments can lead to a positive discussion of this question.

THE REALITY OF THE URBAN BATTLESPACE

Within the urban environment, it is not the weapon itself but rather the environment, which maximizes or mutes an arm's effectiveness. The urban setting is characterized by large three-dimensional areas; twenty to sixty story buildings, all with multi-level basements, extensive underground interconnected complexes and a large but unknown number of non-combatants. An effective weapon merely needs to exploit the vulnerabilities that the urban environment creates. Ground forces may find themselves trapped in an alleyway surrounded by local forces without any prior warning of their movement. The adversary weapons may be thirty to forty years old or built from hardware supplies, but at close range many of their inefficiencies are negated. The growing proliferation of even first generation surface-to-air missiles and anti-aircraft guns may possibly keep attacking air forces at arms length.

World War II holds numerous examples of the difficulty of clearing an urban area held by a determined defender. During this war, forty percent of the battles in the European Theater took place in built up areas. In France and Italy, across Germany and in the Soviet Union, towns and cities often had to be secured building by building, at high cost to defender and attacker alike. In the Pacific Theater, the liberation of Manila was accomplished at a staggering cost to American, Filipino and Japanese lives and material, but six years later – during the Korean War, United Nation forces were able to apply some of the lessons learned in the recapture of Korean towns and cities. Small units, task organized with combined arms capabilities working in concert with air forces capable of isolating and interdicting enemy strong points and reinforcements were key enablers in the recapture of Seoul and were a direct result of lessons learned from World War II urban battles. Urban warfare experience grew when the North Vietnamese Army (NVA) seized South Vietnamese towns and cities during the 1968 Tet Offensive. In the battle for Hue, for example, USA and USMC units, along with South Vietnamese units, drew upon the latest communications, mobility and

firepower technology to conduct successful amphibious, airmobile and ground operations against the NVA. Moreover, recent urban warfare experience is not limited to U.S. involvement. Bitter lessons were relearned by Russian soldiers deployed to Grozny, the capital of Chechnya in January 1995. These lessons were relearned yet again in August 1999 when the Yelstin government went to war a second time against Chechnya. "Some of the lessons learned during these battles include the following: (1) Air superiority is not a guarantee of victory, even against a foe with no air force. (2) Guerrillas can use high tech information assets (cell phones) as easily as modern armies, allowing them to quickly contact others, mobilize assets and access information. (3) Realistic training is essential to overcome guerrilla threats… (6) Helicopter and frontal aviation strikes must be integrated, and ground commanders must learn to work closely with and put more confidence in pilots. (7) Forward Air Controller (FAC) training must be integrated into sub-unit training plans at the earliest possible time. FACs must remain sensitive to guerrilla attempts to capture, mortar or intercept their positions."[xiii] Russian experience underlines the importance of thorough planning and preparation including doctrine and training. Then, as now, success in fighting in built up areas was based upon a combination of combined arms units, doctrinally rigorous and proven unit tactics, practical experience and the application of all available technology.

Aviation assets have played an important role in helping to isolate the objective as well as interdiction of the defender's supplies and reinforcements within and into a built up area. Advancements in fixed and rotary wing aircraft, communication, precision-guided munitions, improved munitions have resulted in greater target accuracy. For example, in 1982 the "Israeli Defense Force besieged the Palestine liberation organization in Beirut by employing bombing by fixed-wing aircraft using cluster bomb units and "smart" bombs as well a phosphorous and other munitions. Attack helicopter gunships operated on the outskirts of the built-up areas with impunity, and medical evacuation also proceeded swiftly

and efficiently with helicopter support."[xiv] In 1999, Russian air forces isolated Chechen resistance fighters in Grozny through a combination of fixed and rotary wing interdiction and strike missions and conducted reconnaissance, assault support and medical evacuation. Russian helicopter tactics evolved as a result of Chechen tactics by using almost zero altitude target ingress from different directions, simultaneously. In short, conducting effective urban warfare will demand historical analysis, experimentation with evolving technology, and integration of effective tactics, techniques and procedures into doctrine followed by rigorous training and integration into planning.

Recent Marine Corps Warfighting Lab (MCWL) experiments have concentrated on examining the tactics, techniques and procedures of conducting combined arms, three-dimensional attack in urban terrain. This experiment, comments in Appendix A, highlighted the inherent risk encountered by the terminal controller in urban battles while executing current CAS doctrine. In order to execute direct positive control, the terminal controller was either too exposed or could not achieve an effective observation position, which drove participants to a reasonable assurance position for terminal control. As previously discussed, reasonable assurance is <u>not</u> a concept that that allows aircraft to engage targets of opportunity as long as the terminal controller agrees that they are indeed enemy targets. Reasonable assurance criteria has typically not been granted by JTF commanders in recent contingencies such as Somalia, Haiti and Panama, where the risk for collateral damage and targeting of friendly forces has been too high for the JTF commander to accept. It is unrealistic and would be unprecedented to assume that currently conceptualized reasonable assurance doctrine will be expanded by future JTF commanders in order to permit air delivered fires in urban settings.

In an effort to address the lethality presented to the terminal controller as well as the delivering air platform, the Marine Corps has further experimented with and has initiated

fielding of a technology which addresses both standoff targeting as well as standoff air delivery of munitions. The system is called the Advanced Close Air Support System (ACASS) and is further described in Appendix B. The individual components include a hand held computer, capable of uploading national/theater intelligence imagery of the urban environment or area of operation with digital terrain elevation data (DTED) data, software tools and a radio modem. The computer software digitizes the CAS brief and through a touch screen stylus, the FAC can generate three-dimensional GPS coordinates of the imaged target. For example, with a single point of the stylus on the computer screen image, the FAC can generate GPS target coordinates for a third floor window of a specific building. The entire CAS brief is then burst transmitted via a radio modem that is then received by the delivering air platform and displayed to the pilot. The modems can operate simultaneously and independently on any useable frequency using encrypted communications if desired. When working with allied FACs or pilots, the language or accent barrier can be all but eliminated. Additionally, the radio modem data link provides a "near real time" graphic of the inbound aircraft as it proceeds toward the target that is overlaid on scaleable maps or imagery. This permits the terminal controller to monitor the attack profile, with any issued attack heading or altitude restrictions, and provide the clearance to drop without using voice communications. Burst transmission and frequency agile data links have been demonstrated over numerous operational evaluations and in recent MCWL fleet experiments. This capability exists in Marine Corps attack fixed wing aviation and a contract for the ground system has been initiated. Additionally, rotary wing aircraft undergoing advanced display upgrades are being provided with the software required to take advantage of this capability.

With this system, the Marine Corps has employed technology to overcome many of the early tactical urban warfare deficiencies encountered by the terminal controller. Coupled with GPS capable aircraft and GPS capable munitions, "first pass visual target acquisition by

5 pilots exceeded 95 percent in over 100 runs and bomb-on-coordinate methods successfully discriminated between a tank target and a tire stack within 100 meters of each other."[xv] Terminal controllers who have used the system were initially apprehensive but after hands on training were enthusiastically supportive.

The interesting issue is why were they apprehensive? The answer is not just that they were employing a novel technical capability but that this form of terminal control did not fit neatly into current doctrine. With this system, the terminal controller may not require visual acquisition of either the target or the delivering aircraft to be convinced that the pilot will attack the designated target. This system may permit the terminal controller to conduct a CAS mission without having to reach observation points or expose himself to a troops-in-contact situation. Is this form of control positive control or reasonable assurance? It would appear that by monitoring the inbound aircraft track and how it is complying with FAC provided restrictions that one could assume this might embody the "other means" phrase of direct positive control. In this case, the terminal controller may not be able to see the attacking aircraft but has confirmed that the aircraft is attacking the correct target and has friendly positions in sight. If the friendly positions are within an urban dwelling, it is highly questionable that the delivering aircraft can confirm that friendly positions are in sight and therefore doctrinal direct positive control is not maintained. This system does not fit the current doctrine description of indirect control either. Indirect control is used when the terminal controller cannot observe the attack, but is in contact with someone who can. In the urban environment, troops-in-contact will be even more disadvantaged as the terminal controller to observe the attack. Since communication is maintained throughout the attack, this form of control doesn't fit the current reasonable assurance concept. Experimentation and analysis of historical urban battles reveals that to be effective and survive in the urban environment, the terminal controller will need to be offset from a troops-in-contact position

yet capable of calling for and controlling fast reacting CAS. The ACASS system may well address these requirements but creates a form of terminal control that has not been addressed in doctrine.

While terminal control is one doctrinal issue, precisely delivered and scaleable yield munitions completes the effectiveness of air delivered fires. Air delivered munitions today has evolved significantly. Current GPS munitions are in the 1000-pound class, although smaller 100 to 500 pound class laser and GPS munitions, suitable for less collateral urban damage, are either in test or awaiting funding for test completion. An example is the Joint Direct Attack Munition (JDAM), a relatively low cost kit that converts existing inventory unguided bombs to "accurate" guided bombs by attaching a GPS receiver in the tail section and stability and flight control fins to the body of existing bombs. "Over 245 JDAMs have been dropped since 1996, which have achieved a 9.6m Circular Error Probability (CEP) accuracy despite its 13m CEP requirement."[xvi] While these accuracies can be viewed as impressive, are they the best weapon capable for the urban environment? In other words, if CAS doctrine expected U.S. air forces to conduct CAS within the historic analysis of 50 to 100 meter distance between friendly and adversary forces, then doctrine would drive requirements to develop munitions capable of this accuracy.

DOCTRINAL MODERNIZATION IS REQUIRED

The CINC and JTF commander have been and will continue to be required to address contingency operations in the urban environment. Historical analyses of urban conflicts indicate that effective urban forces include combined arms units, doctrinally sound unit tactics, practical experience and the application of all available technology. Aircraft conducting CAS offer three-dimensional approach paths, multiple attack angles and precision guided munitions highlighting the value and flexibility of air delivered fires in this

environment. Current doctrine in employing these capabilities limits the effectiveness and reduces the survivability of the terminal controller.

Current CAS doctrine does not require significant change, however, recent experimentation and fielding of enhanced communications, "near real time" monitoring of the CAS attack profile, standoff munitions and the lethality of exposure for the terminal controller in the urban environment indicate that some modernization of positive control is warranted. A more appropriate term, which merges direct and indirect control, may be "virtual control" or "virtual assurance". The requirement for the terminal controller to visually acquire both the target and CAS aircraft to execute a CAS mission is antiquated and through experimentation, has been proven impractical in the urban environment. Changing CAS doctrine has been debated extensively, with relatively no improvement over the past 20 years to take advantage of existing technology. Without an update of doctrine, tactics, techniques and procedures will remain unresponsive to the reality of the urban environment.

Secondly, and more fundamentally, as force structure continues to become lighter and more joint, a higher value will be placed on CAS to offset possible enemy armor and friendly artillery shortfalls. Precision munitions can efficiently and effectively destroy individual adversary armor, as well as interdict lines of communication, reinforcement and supply. Some of this CAS will undoubtedly be beyond the visual range of the terminal controller yet within an area requiring coordinated fire support. Autonomous aviation delivered fires may not be released in this beyond visual range arena, yet "virtual control" would give the ground commander and the terminal controller a method to control such fires.

Finally, joint adoption of a form of "virtual control" into doctrine would address the doctrinal sanctuary discussed in the AFDD, continue the excellent evolutionary trend of joint doctrine in the employment and control of CAS, and address the urban battlespace from a realistic perspective. Modernization of current CAS doctrine would advance tactics,

techniques and procedures to take advantage of available technology, accelerate high precision low yield munitions development and return the tool of precise air delivered fires to the JTF commander.

Appendix A

Urban Warrior Findings

" Findings from the Urban Warrior 97 exercise found that CAS participants lacked the capability to consistently perform positive combat identification. Visual identification (VID) is the only positive target ID method currently organic to the battalion and below warfighters. Participants strove to obtain positive IDs by using VID and national/theater intelligence platforms and networks, however positive IDs were difficult to achieve and participants resorted to a procedural ID method during a majority of CAS events. Obtaining a VID placed the FAC/TACP/FO in a "troops in contact" situation and on several occasions the FAC/TACP/FO was engaged and killed by the OPFOR. Procedural IDs fell well short of positive ID and did not address actual ID of an entity. Instead, the procedural ID process focused on the relative position of the target to be identified in relation to a known friend in addition to national/theater intelligence systems information. Positive direct control using ground FAC/TACP/ANGLICO and medium/high altitude tactics was ineffective. Terminal controllers initially complied with positive direct control in accordance with J-CAS 3-09.3. This frequently placed the FAC within troops in contact or danger close criteria. FACs had difficulty reaching effective observation positions during the maneuver battle. Risk of friendly injury from CAS attacks in danger close situations discouraged the use and reduced the effectiveness of CAS. Subsequently, all participants agreed on the use of reasonable assurance to clear CAS weapons delivery. Additionally, participants evolved into using an abbreviated CAS brief instead of the 9-line brief, due to a medium altitude profile allowing more time in the objective area. Participating aircraft with GPS made the 9-line brief "obsolete". The abbreviated format included target coordinates, friendly location and any attack restrictions. This was preferred by GPS aircraft, facilitated getting the aircraft in the target area sooner to build SA and aided in target acquisition." [1]

Author's Translation

Current CAS doctrine requires the terminal controller (or an observer in contact with the target) to visually acquire and identify the proposed target as hostile, hence the term positive identification. Once it has been positively identified, the target location and descriptive information is passed to the attacking platform. Procedural identification varies from positive identification in that the terminal controller will describe the target from geographical map references or imagery references and in relation to known friendly positions. Once the CAS aircraft has these boundaries identified, then he frequently was cleared to delivery weapons. To obtain a visual identification in the urban environment, the terminal controller frequently had to move into a troops-in contact position, which left him exposed, and at risk to opposing forces. During the two exercises that the author witnessed (12-15 total urban engagements), approximately fifty per cent of the time the terminal controller and the entire tactical air control party was annihilated. The FACs complained of not being able to achieve positions that permitted observation of the urban battle and ability to visually acquire CAS aircraft. Pilots flew tactics based on a medium level threat, which forced aircraft to minimally transit an altitude sanctuary. Two deficiencies resulted; First, pilots typically reported late target acquisition and Second, FACs typically reported either no or late visual acquisition of the attacking aircraft. Both factors contributed to no weapon delivery because either the FAC could not visually acquire the aircraft to ensure the pilot was attacking the correct target and issue the final clearance to deliver, or by acquiring the target late in the attack run the pilot could not correct in time to produce a bomb sight-target solution.

The resort to reasonable assurance was not necessarily based on doctrine but rather on what was possible with the current doctrine and tools available. While post mission reports

generally produced positive comments with this form of control, the end result was, in effect, to create a boundary beyond which CAS aircraft could operate (in close contact with friendlies) under more or less autonomous conditions. CAS pilot comments were positive with the general sentiment that they were contributing more to the engagement. Senior commander comments were less enthusiastic with the general sentiment that creating a free fire zone for attacking aircraft in the immediate vicinity of friendly forces was a formula for increased fratricide.

The most positive finding was that use of GPS coordinates helped both CAS pilot target acquisition and FAC confidence that the pilot was attacking the correct target.

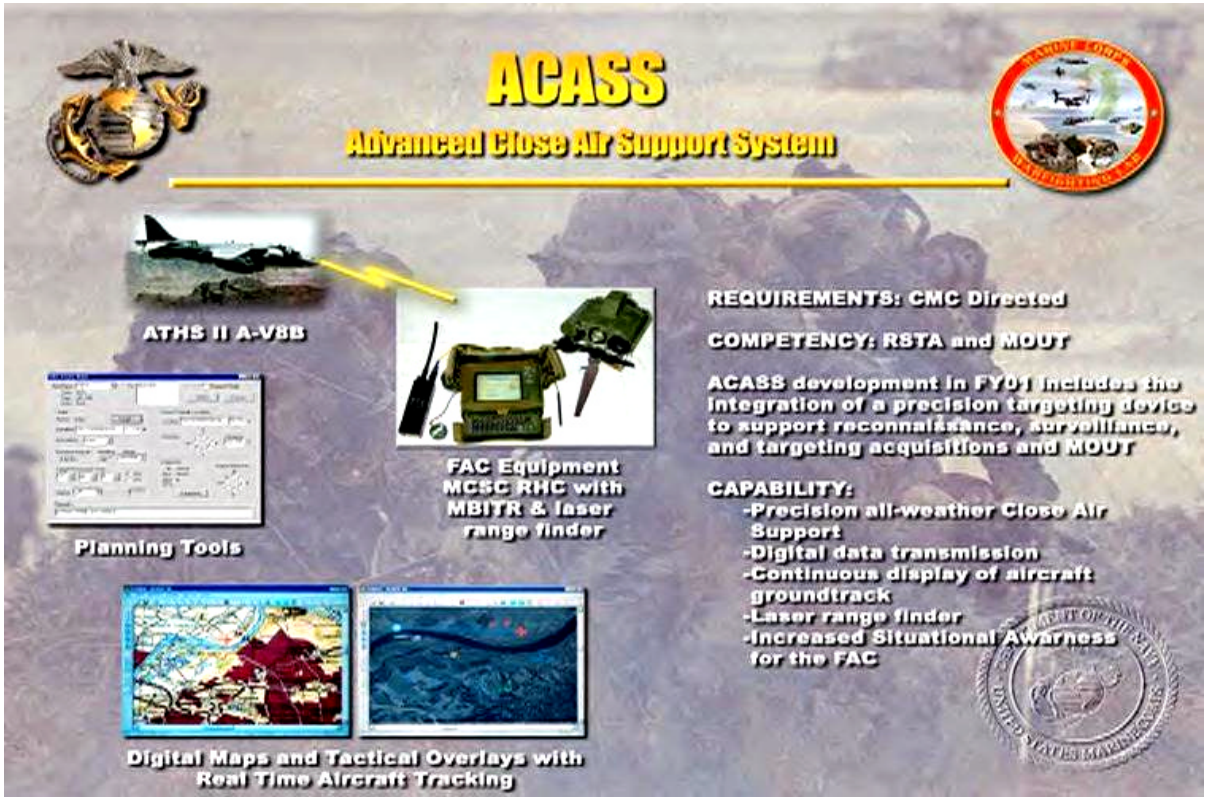
ENDNOTES

[1] United States Marine Corps, MAWTS-1 Aviation Combat Element (ACE) MOUT Manual, ed. IX (MAWTS-1, MCAS Yuma, AZ: 1 Sept 00), 5-44.

Appendix B

Advanced Close Air Support System (ACASS)

"The Advanced Close Air Support System (ACASS) is an experimental system that is the marriage of a ruggedized hand-held computer (RHC), with a set of MELIOS binoculars. The set-up enables the sharing of tactical overlays with aircraft in real-time, allows for digital transmission, a continuous display of aircraft's groundtrack and precision, all-weather close air support. The system has been provided to the operating forces for evaluation. There are currently 10 ACASS sets with I MEF and 10 with II MEF."[1]



[1] Jennifer Morrison Taw and Bruce Hoffman, "The Urbanization of Insurgency: The Potential Challenge to U.S. Army Operations," Small Wars and Insurgencies (London: Frank Cass, Vol. 6, No. 1, Spring 1995), p.69.
[i] Department of the Air Force, Air Force Restructure, white paper, September 1991.
[ii] Joint Chiefs of Staff, Joint Tactics, Techniques, and Procedures for Close Air Support (CAS) Joint Pub 3-09.3 (Washington, DC: 1 December 1995), I-3.

[iii] United States Marine Corps, Close Air Support MCWP 3-23.1 (Quantico, Virginia: 30 July 1998), 1-1.
[iv] Joint Chiefs of Staff, Joint Tactics, Techniques, and Procedures for Close Air Support (CAS) Joint Pub 3-09.3 (Washington, DC: 1 December 1995), V-9.
[v] Ibid, V-9.
[vi] Ibid, V-9-10.
[vii] Ibid, V-10.
[viii] Ibid, V-10.
[ix] United States Marine Corps, Close Air Support MCWP 3-23.1 (Quantico, Virginia: 30 July 1998), 4-14.
[x] Unites States Air Force, Counterland AFDD 2-1.3 (Maxwell Air Force Base, Alabama: 27 August 1999), 56.
[xi] Ibid, 57.
[xii] Ibid, 58.
[xiii] United States Marine Corps, MAWTS-1 Aviation Combat Element (ACE) MOUT Manual, ed IX (MAWTS-1, MCAS Yuma, AZ: 1 Sept 00), 5-17.
[xiv] Ibid, 1-21.
[xv] Philip H. King, "CAS Innovations: Digital Data Burst and ATHS", Marine Corps Gazette, (May 1996): 60.
[xvi] "Joint Direct Attack Munition," http://www.boeing.com/defense-space/missiles/jdam/jdamspec/htm, (20 Mar 2000).
[1] United States Marine Corps, MAWTS-1 Aviation Combat Element (ACE) MOUT Manual, ed. IX (MAWTS-1, MCAS Yuma, AZ: 1 Sept 00), 5-44.
[1] "Questions and Answers About the Marine Corps Warfighting Lab." Marine Corps Warfighting Laboratory Public Affairs Questions and Answers. 15 May 2001. https://www.mcwl.quantico.usmc.mil[15 May 2001].

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